



### SPECIFICATIONS

**CUSTOMER NAME** : \_\_\_\_\_

**CUSTOMER REFERENCE NO.** : \_\_\_\_\_

**MODULE NUMBER** : TSG12864-1185-FFDLWS-R

**SAMPLE VERSION** : NO.1

**SPECIFICATIONS EDITION** : V0

**DRAWING NO. (Ver.)** : A1

**PACKAGING NO. (Ver.)** : TBD

**Customer Approved**

**Date:**

Approved	Checked	Designer
	Aron	Sean

- Preliminary specification for design input
- Full specification for sample approval





**Contents:**

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## 1. SPECIFICATIONS

### 1.1 Features

Item	Description
Display Type	128*64 Dots
LCD Type	FSTN /Positive/ Transflective
Driver Condition	1/65 duty, 1/9bais
Viewing Direction	6 O'clock
Backlight Color	White Color
Module weight	About 22.0g
Interface	6800/8080
LCD driver IC	ST7567S-G4
ROHS2.0	YES

### 1.2 Mechanical Specifications

Item	Standard Value	Unit
Outline Dimension	58.20(L) *39.00(w) *8.00 (H) (Exclude the pin)	mm
Viewing Area	50.00(L) * 25.00(w)	mm
Active Area	46.05(L) * 23.01(w)	mm
Dots Size	0.33(L) *0.33(w)	mm
Dots Pitch	0.36(L) *0.36(W)	mm

Note : For detailed information please refer to LCM drawing

### 1.3 Absolute Maximum Ratings

Item	Symbol	Condition	Min.	Max.	Unit
Power Supply Voltage	$V_{DD}$	—	-0.3	4.0	V
LCD Power Supply Voltage	$V_{LCD}, V_0$	—	-0.3	14	V
Any input/output	$V_{IN}/ V_{OUT}$	—	-0.3	$V_{DD}+0.3$	V
Operating Temperature	$T_{OP}$	—	-20	70	°C
Storage Temperature	$T_{ST}$	—	-40	80	°C
Storage Humidity	$H_D$	$T_a < 40\text{ °C}$	-	90	%RH

## 1.4 DC Electrical Characteristics

$V_{DD}=3.0\text{ V} \pm 5\%$  ,  $V_{SS}=0\text{ V}$  ,  $T_a=25^\circ\text{C}$

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Operating Voltage	$V_{DD}$	-	2.85	3.0	3.15	V
Input High-level Voltage	$V_{IHC}$	-	$0.7V_{DD}$	-	$V_{DD}$	V
Input Low-level Voltage	$V_{ILC}$	-	$V_{SS}$	-	$0.3V_{DD}$	V
Output High-level Voltage	$V_{OHC}$	-	$0.8V_{DD}$	-	$V_{DD}$	V
Output Low-level Voltage	$V_{OLC}$	-	$V_{SS}$	-	$0.2V_{DD}$	V
LCD Supply Power	$V_{LCD}$	-	9.8	10.0	10.2	V
Supply Current	$I_{DD}$	$V_{DD}=3.0\text{V}, V_{op}=10.0\text{V},$ Pattern= Vertical display	-	0.43	0.65	mA

## 1.5 Optical Characteristics

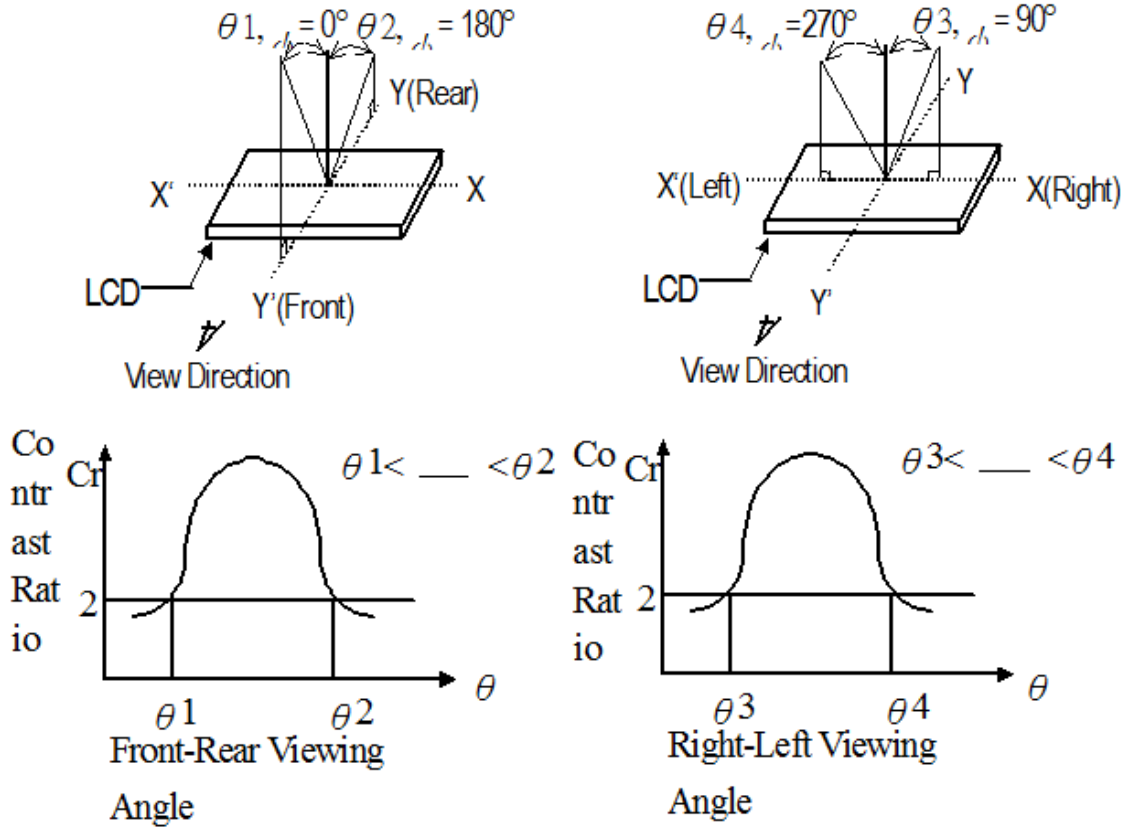
LCD Panel : 1/65Duty , 1/9Bias ,  $V_{OP}=10.0\text{ V}$  ,  $T_a=25^\circ\text{C}$

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit	Reference	
Response Time	$T_{on}$	$C \geq 2.0$	-	150	250	ms	Note3	
	$T_{off}$		-	170	300			
Viewing angle range	=0(6H)		Y'	20	35	-	Deg.	Note1
	=90(3H)		X	20	35	-		
	=180(12H)	Y	10	25	-			
	=270(9H)	X'	20	35	-			
Contrast Ratio	C	$\theta = 0^\circ$	4	6	-	-	Note2	
Average Brightness (with LCD)	IV	IF=15mA	30	50	-	Cd/m <sup>2</sup>	Note4	
Uniformity(with LCD)	$\Delta B$		70	75	-	%		



Note 1

Definition of viewing angle

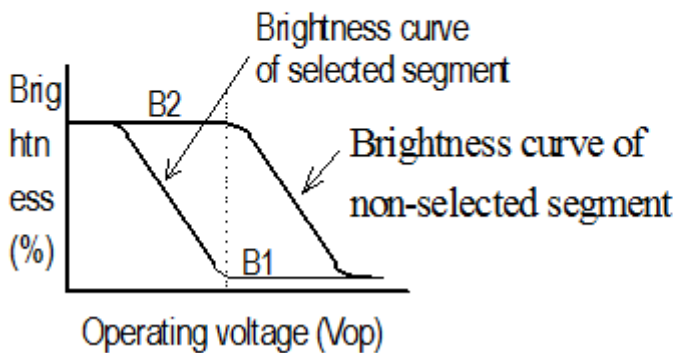


Note 2

Definition of contrast

RATIO

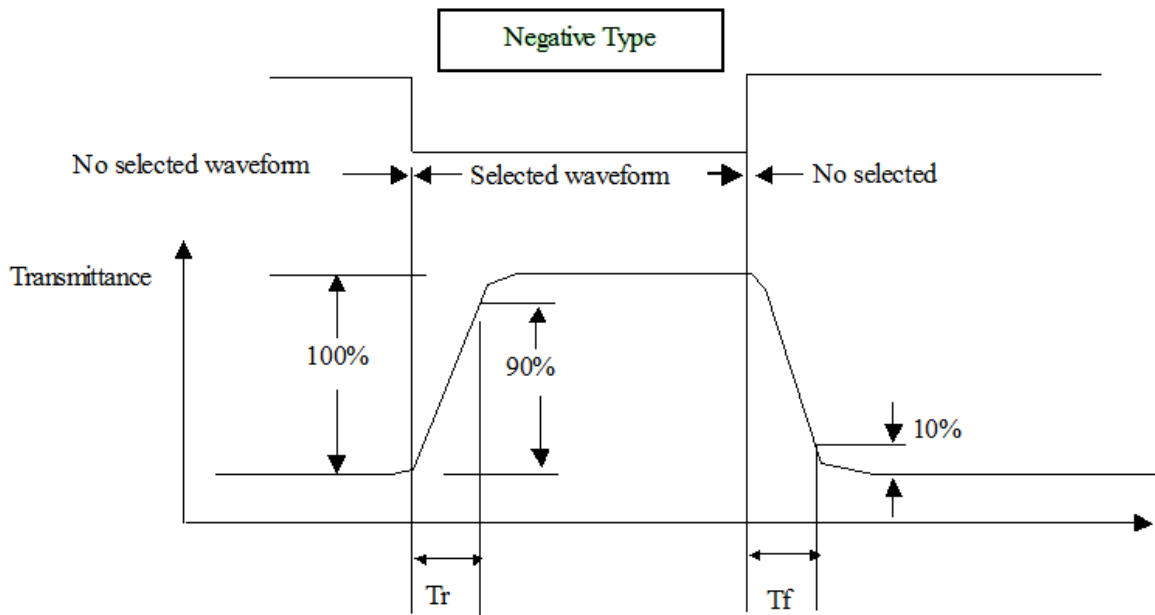
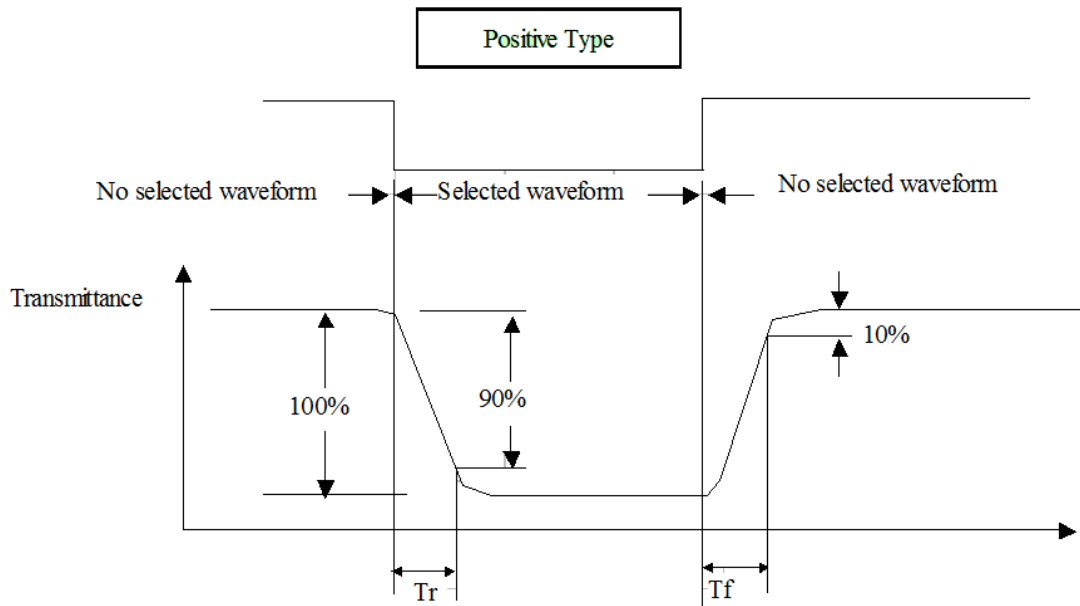
$$C.R = \frac{\text{Brightness of nonselected segment (B2)}}{\text{Brightness of selected segment}}$$





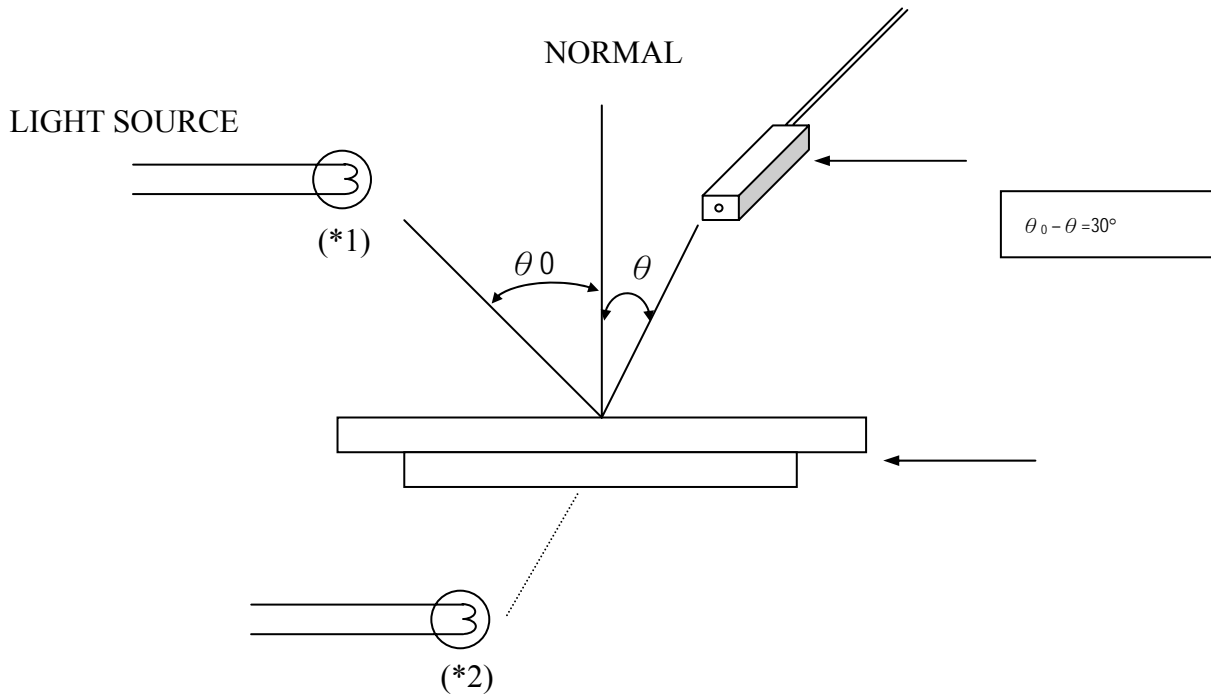
Note 3

Definition of response time



Note 4

Measuring Instruments For Electro-optical Characteristics



\*1.Light source position for measuring the reflective type of LCD panel

\*2.Light source position for measuring the transfective / transmissive types of LCD panel





### 1.6 Backlight Characteristics

LCD Module with LED Backlight

Maximum Ratings

Item	Symbol	Conditions	Min.	Max.	Unit
Forward Current	IF	Ta =25℃	-	20	mA
Reverse Voltage	VR	Ta =25℃	-	5.0	V
Reverse Current	IR	VR= 5V	-	10	uA
Power Dissipation	PD	Ta =25℃	-	64	mW

Electrical / Optical Characteristics

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
Forward Voltage	IF	IF=15mA	2.8	3.0	3.2	V
Average Brightness (without LCD)	IV	IF=15mA	55	-	-	cd/m <sup>2</sup>
Color Coordinates (Without LCD)	Hue	IF=15mA	X=0.26 Y=0.26	X=0.29 Y=0.29	X=0.32 Y=0.32	nm
Color	White					

# 2. MODULE STRUCTURE

## 2.1 Counter Drawing

### 2.1.1 LCM Mechanical Diagram

**Signature:** \_\_\_\_\_ **Date:** \_\_\_\_\_

All Pages Of This Edition Approved

REV.	DESCRIPTION	REVISER	DATE
A0	New Drawing	kuangshenggen	2018/09/15
A1	IC被零件改为ST7567S,增加散热贴	kuangshenggen	2018/10/31

Viewing Direction: FRONT, BACK

Labels: LCD39.00, BL 58.20, LCM55.87, 50.00(V.A), 46.05(A.A), 17.16, 1.10, 4.095, 13.975, 7.96, 9.07, 29.00, 25.00(V.A), 23.01(A.A), 19.30±0.05, P1.27\*19-24.13±0.3, 20, 28.37±0.5, 63.20, 5.10, 5.50±0.05, UV GLUE, SILICONE, BLACK TAPE, PULL TAPE, IC, K, A, K, K, A, K, K, W=0.70±0.1, 10.20, 28.50, 6.90±0.05, P1.0\*17=17.00±0.1, 2.50, 2.50, 10.68, 36.70, 41.70±0.5, 2.54±0.1, 1.60, 1.60, 17-ø1.60, 18-ø1.60, 4-ø3.50, 4-ø2.50±0.1, P2.54\*8=20.32±0.1

**SPECIFICATION:**

Display Type	FS1N	White Color: Uniformity:70%(MIN)
Drive Method	Positive Transistechde	Backlight
Viewing Direction	1/6SDuty	Luminance: 55cd/m <sup>2</sup> (MIN)
Vop	1/9Bias	IF: 15mA, VF: 3.0±0.2V
Vdd	6.00 O'clock	X: 0.26~0.32 Y: 0.26~0.32
Drive IC	3.0V	Customer NO.
Environmental protection requirements:	ST7567S-G4	Top
	RoHS 2.0	Tst
	REACH	With '°'
	Halogen-free	Important Dimension
		Reference Dimension

**DOTS SIZE SCALE 10/1**

**COM & SEG LAYOUT**

**BIL. CIRCUIT DIAGRAM**

**PIN Definition**

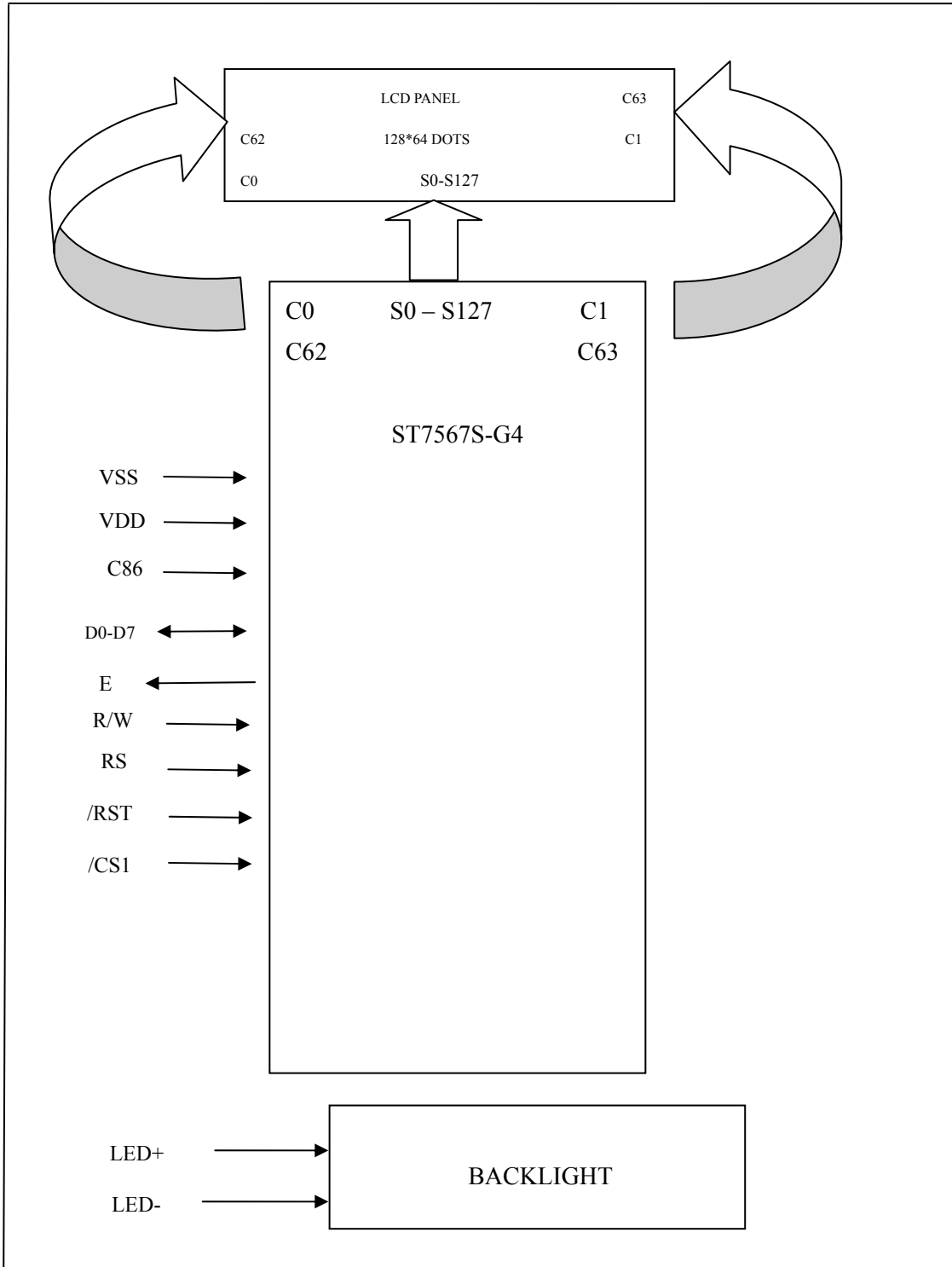
1	VSS
2	VDD
3	C86
4	DB7
5	DB6
6	DB5
7	DB4
8	DB3
9	DB2
10	DB1
11	DB0
12	E
13	RW
14	RS
15	RST
16	CS1
17	LED+
18	LED-

**东莞市一众显示科技有限公司**  
DONG GUAN TEAM SOURCE DISPLAY TECH. CO, LTD.

UNSPECIFIED TOLERANCE: ±0.3	UNITS: mm	DATE: 2018/10/31	PART NUMBER: HSG12864-1185-FD/LWS-R	SHEET: 1 OF 1
DESIGN BY: kuangshenggen	2018/10/31	CHECKED BY: xiaolongqiang	2018/10/31	DRAWING DESCRIPTION: MODEL
APPROVED BY: lizhong	2018/10/31	DO NOT SCALE THIS DRAWING.	PROJECTION	



### 2.1.2 Block Diagram

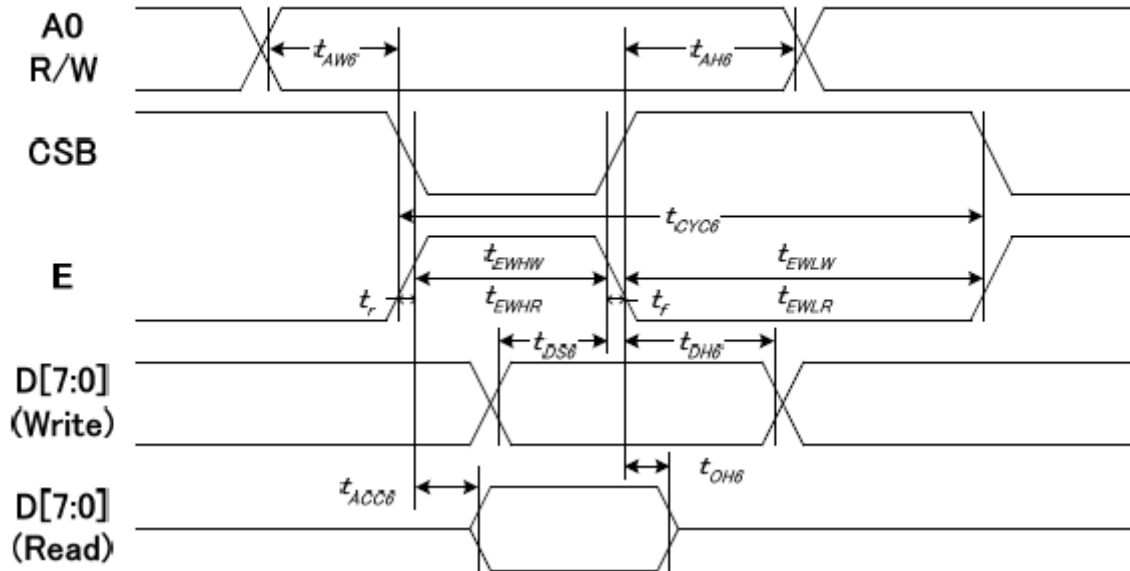


## 2.2 Interface Pin Description

Pin No.	Symbol	Signal Description
1	VSS	Power Ground
2	VDD	Main Power supply for the LCM
3	C86	This is the MPU interface selection pin. C86 = "H": 6800 Series MPU interface. C86 = "L": 8080 Series MPU interface.
4	DB7	8-bit Bi-direction databus D[7:0].
5	DB6	
6	DB5	
7	DB4	
8	DB3	
9	DB2	
10	DB1	
11	DB0	
12	RD(E)	Enable clock input for 6800 series MPU
13	RW(R/W)	Read/Write signal for 6800 series MPU.
14	RS	Command/Data selection control pin.H for display data and L for command data
15	/RST	Hardware reset pin. Low active
16	/CS1	Chip selection control pin. Low active
17	LED+	LED anode.
18	LED-	LED cathode

## 2.3 Timing Characteristics

### 14-1 System Bus Timing for 6800 Series MPU



(VDD1 = 3.3V, Ta = 25°C)

Item	Signal	Symbol	Condition	Min.	Max.	Unit
Address setup time	A0	tAW6		0	—	ns
Address hold time		tAH6		10	—	
System cycle time	E	tCYC6		240	—	
Enable L pulse width (WRITE)		tEHLW		80	—	
Enable H pulse width (WRITE)		tEHWLW		80	—	
Enable L pulse width (READ)		tEHLR		80	—	
Enable H pulse width (READ)	tEWHR		140	—		
Write data setup time	D[7:0]	tDS6		40	—	
Write data hold time		tDH6		10	—	
Read data access time		tACC6	CL = 16 pF	—	70	
Read data output disable time		tOH6	CL = 16 pF	5	50	



(VDD1 = 2.8V , Ta =25°C)

Item	Signal	Symbol	Condition	Min.	Max.	Unit
Address setup time	A0	tAW6		0	—	ns
Address hold time		tAH6		0	—	
System cycle time	E	tCYC6		400	—	
Enable L pulse width (WRITE)		tEWLW		220	—	
Enable H pulse width (WRITE)		tEWHW		180	—	
Enable L pulse width (READ)		tEWLR		220	—	
Enable H pulse width (READ)		tEWHR		180	—	
Write data setup time		D[7:0]	tDS6		40	
Write data hold time	tDH6			20	—	
Read data access time	tACC6		CL = 16 pF	—	140	
Read data output disable time	tOH6		CL = 16 pF	10	100	

(VDD1 = 1.8V , Ta =25°C)

Item	Signal	Symbol	Condition	Min.	Max.	Unit
Address setup time	A0	tAW6		0	—	ns
Address hold time		tAH6		0	—	
System cycle time	E	tCYC6		640	—	
Enable L pulse width (WRITE)		tEWLW		360	—	
Enable H pulse width (WRITE)		tEWHW		280	—	
Enable L pulse width (READ)		tEWLR		360	—	
Enable H pulse width (READ)		tEWHR		280	—	
Write data setup time		D[7:0]	tDS6		80	
Write data hold time	tDH6			20	—	
Read data access time	tACC6		CL = 16 pF	—	240	
Read data output disable time	tOH6		CL = 16 pF	10	200	

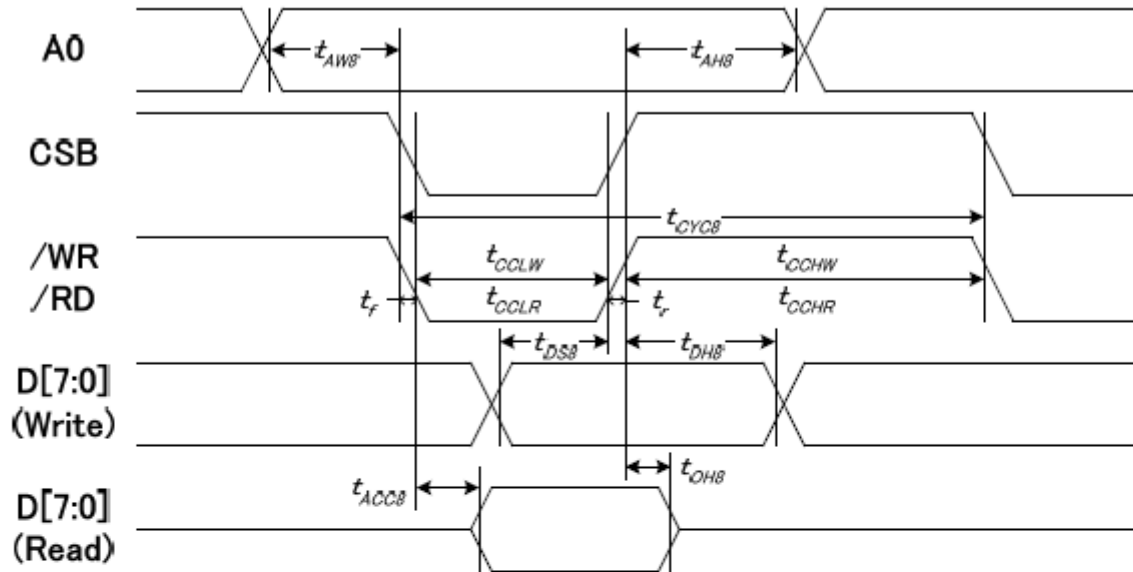
\*1 The input signal rise time and fall time (tr, tf) is specified at 15 ns or less. When the system cycle time is extremely fast,  $(tr + tf) \leq (tCYC6 - tEWLW - tEWHW)$  for  $(tr + tf) \leq (tCYC6 - tEWLR - tEWHR)$  are specified.

\*2 All timing is specified using 20% and 80% of VDD1 as the reference.

\*3 tEWLW and tEWLR are specified as the overlap between CSB being "L" and E.



## 14-2 System Bus Timing for 8080 Series MPU



(VDD1 = 3.3V, Ta = 25°C)

Item	Signal	Symbol	Condition	Min.	Max.	Unit
Address setup time	A0	tAW8		0	—	ns
Address hold time		tAH8		10	—	
System cycle time	/WR	tCYC8		240	—	
/WR L pulse width (WRITE)		tCCLW		80	—	
/WR H pulse width (WRITE)		tCCHW		80	—	
/RD L pulse width (READ)		RD	tCCLR		140	
/RD H pulse width (READ)	tCCHR			80	—	
WRITE Data setup time	D[7:0]	tDS8		40	—	
WRITE Data hold time		tDH8		20	—	
READ access time		tACC8	CL = 16 pF	—	70	
READ Output disable time		tOH8	CL = 16 pF	5	50	

(VDD1 = 2.8V, Ta = 25°C)

Item	Signal	Symbol	Condition	Min.	Max.	Unit
Address setup time	A0	tAW8		0	—	ns
Address hold time		tAH8		0	—	
System cycle time	/WR	tCYC8		400	—	
/WR L pulse width (WRITE)		tCCLW		220	—	
/WR H pulse width (WRITE)		tCCHW		180	—	
/RD L pulse width (READ)		RD	tCCLR		220	
/RD H pulse width (READ)	tCCHR			180	—	
WRITE Data setup time	D[7:0]	tDS8		40	—	
WRITE Data hold time		tDH8		20	—	
READ access time		tACC8	CL = 16 pF	—	140	
READ Output disable time		tOH8	CL = 16 pF	10	100	



(VDD1 = 1.8V , Ta =25°C)

Item	Signal	Symbol	Condition	Min.	Max.	Unit
Address setup time	A0	tAW8		0	—	ns
Address hold time		tAH8		0	—	
System cycle time	/WR	tCYC8		640	—	
/WR L pulse width (WRITE)		tCCLW		360	—	
/WR H pulse width (WRITE)		tCCHW		280	—	
/RD L pulse width (READ)	RD	tCCLR		360	—	
/RD H pulse width (READ)		tCCHR		280	—	
WRITE Data setup time	D[7:0]	tDS8		80	—	
WRITE Data hold time		tDH8		20	—	
READ access time		tACC8	CL = 16 pF	—	240	
READ Output disable time		tOH8	CL = 16 pF	10	200	

\*1 The input signal rise time and fall time (tr, tf) is specified at 15 ns or less. When the system cycle time is extremely fast,  $(tr + tf) \leq (tCYC8 - tCCLW - tCCHW)$  for  $(tr + tf) \leq (tCYC8 - tCCLR - tCCHR)$  are specified.

\*2 All timing is specified using 20% and 80% of VDD1 as the reference.

\*3 tCCLW and tCCLR are specified as the overlap between CSB being "L" and WR and RD being at the "L" level.





### 3. Inspection Specification

AQL inspection standard

Sampling method: GB/T2828.1-2012, Level II, single sampling

Defect classification :

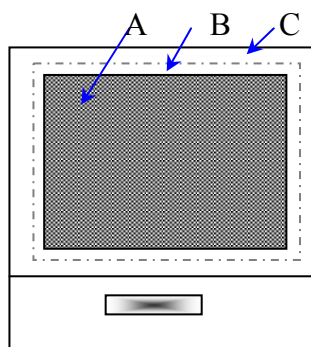
Classify	Item	Note	AQL
Major	Short or open circuit	1	0.65
	LC Leakage		
	Display flickering		
	No display		
	Wrong viewing direction		
	Wrong Back-light color		
Minor	Contrast defect(dim,ghost)	2	1.0
	Background color deviation	2	
	black & white spot, dust	3	
	Black,white line defect	4	
	Rainbow	5	
	Chip	6	
	Pin hole	7	
	Cross talk	Refer to sample	

Definition:

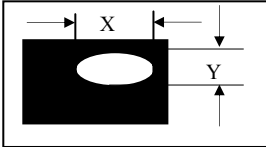
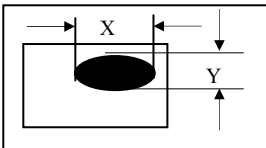
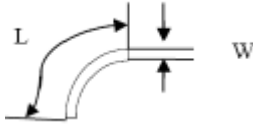
Zone A: Active Area

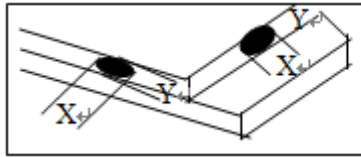
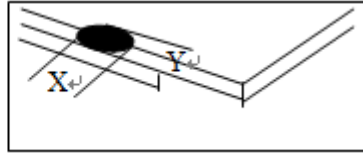
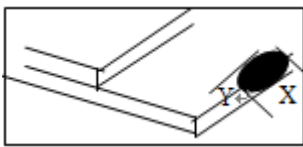
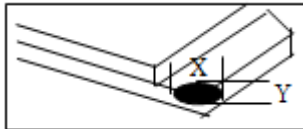
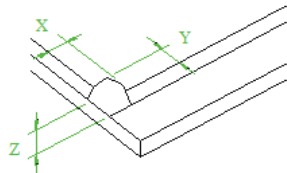
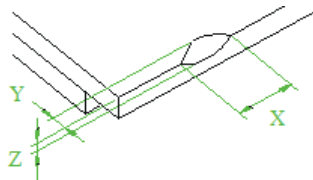
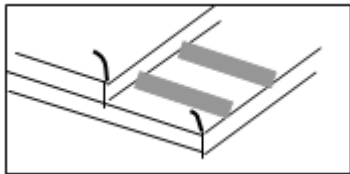
Zone B: Visible Area

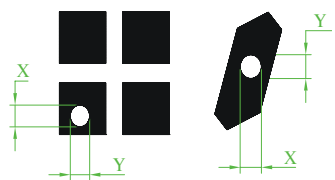
Zone C: outside of Visible Area





No.	Item	Criterion																										
1	Short or open circuit	Not allowed																										
	LC leakage																											
	Flickering																											
	No display																											
	Wrong viewing direction																											
	Wrong Back-light color																											
2	Contrast defect	Refer to approval sample																										
	Background color deviation																											
3	black & white spot, dust(including polarizer). $\phi = (X + Y) / 2$	  <table border="1" data-bbox="954 891 1417 1182"> <thead> <tr> <th rowspan="2">Point size</th> <th colspan="3">Acceptable QTY</th> </tr> <tr> <th>A</th> <th>B</th> <th>C</th> </tr> </thead> <tbody> <tr> <td><math>\Phi \leq 0.1</math></td> <td colspan="2">Any</td> <td rowspan="3">Any</td> </tr> <tr> <td><math>0.1 &lt; \Phi \leq 0.15</math></td> <td>2</td> <td>3</td> </tr> <tr> <td><math>0.15 &lt; \Phi \leq 0.2</math></td> <td>0</td> <td>1</td> </tr> </tbody> </table> <p>Unit:mm</p>	Point size	Acceptable QTY			A	B	C	$\Phi \leq 0.1$	Any		Any	$0.1 < \Phi \leq 0.15$	2	3	$0.15 < \Phi \leq 0.2$	0	1									
Point size	Acceptable QTY																											
	A	B	C																									
$\Phi \leq 0.1$	Any		Any																									
$0.1 < \Phi \leq 0.15$	2	3																										
$0.15 < \Phi \leq 0.2$	0	1																										
4	Black,white line defect	 <table border="1" data-bbox="826 1294 1417 1585"> <thead> <tr> <th colspan="2">Size</th> <th colspan="3">Acceptable QTY</th> </tr> <tr> <th>L</th> <th>W</th> <th>A</th> <th>B</th> <th>C</th> </tr> </thead> <tbody> <tr> <td>Any</td> <td><math>W \leq 0.01</math></td> <td>Any</td> <td>Any</td> <td rowspan="3">Any</td> </tr> <tr> <td rowspan="2"><math>L \leq 2</math></td> <td><math>0.01 &lt; W \leq 0.02</math></td> <td>2</td> <td>4</td> </tr> <tr> <td><math>0.02 &lt; W \leq 0.03</math></td> <td>1</td> <td>2</td> </tr> <tr> <td></td> <td><math>0.03 &lt; W</math></td> <td>0</td> <td>0</td> </tr> </tbody> </table> <p>Unit:mm Remark: While <math>W &gt; 0.03</math>, refer to point defect</p>	Size		Acceptable QTY			L	W	A	B	C	Any	$W \leq 0.01$	Any	Any	Any	$L \leq 2$	$0.01 < W \leq 0.02$	2	4	$0.02 < W \leq 0.03$	1	2		$0.03 < W$	0	0
Size		Acceptable QTY																										
L	W	A	B	C																								
Any	$W \leq 0.01$	Any	Any	Any																								
$L \leq 2$	$0.01 < W \leq 0.02$	2	4																									
	$0.02 < W \leq 0.03$	1	2																									
	$0.03 < W$	0	0																									
5	Rainbow	Not more than two colors change across the viewing area																										

<p>6</p> <p>Chip</p> <p>Remark:</p> <p>T: glass thickness</p> <p>X: Notch in X direction</p> <p>Y : Notch in Y direction</p> <p>Z : Notch in Z direction</p>	<p>A type and B type :General</p> <div style="display: flex; justify-content: space-around;">   </div> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th>X</th> <th>Y</th> <th>Z</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Any</td> <td><math>\leq 2.0</math></td> <td><math>\leq 1/2t</math></td> </tr> <tr> <td>2</td> <td><math>\leq 1/8 X</math> direction glass length</td> <td>Can not reach the Visible area</td> <td><math>\leq t</math></td> </tr> </tbody> </table>		X	Y	Z	1	Any	$\leq 2.0$	$\leq 1/2t$	2	$\leq 1/8 X$ direction glass length	Can not reach the Visible area	$\leq t$
		X	Y	Z									
	1	Any	$\leq 2.0$	$\leq 1/2t$									
	2	$\leq 1/8 X$ direction glass length	Can not reach the Visible area	$\leq t$									
	<p>C Type :ITO terminal</p> <div style="display: flex; justify-content: space-between;">  <table border="1" style="width: 80%; border-collapse: collapse;"> <thead> <tr> <th>X</th> <th>Y</th> <th>Z</th> </tr> </thead> <tbody> <tr> <td>Any</td> <td><math>\leq 0.3</math></td> <td><math>\leq 1/2t</math></td> </tr> <tr> <td><math>\leq 1/8X</math> direction (or <math>X \leq 2</math>)</td> <td><math>\leq 1/5t</math></td> <td><math>\leq t</math></td> </tr> </tbody> </table> </div>	X	Y	Z	Any	$\leq 0.3$	$\leq 1/2t$	$\leq 1/8X$ direction (or $X \leq 2$ )	$\leq 1/5t$	$\leq t$			
	X	Y	Z										
	Any	$\leq 0.3$	$\leq 1/2t$										
$\leq 1/8X$ direction (or $X \leq 2$ )	$\leq 1/5t$	$\leq t$											
<p>D Type :Corner 1 ( on ledge)</p> <div style="display: flex; justify-content: space-between;">  <table border="1" style="width: 80%; border-collapse: collapse;"> <thead> <tr> <th>X</th> <th>Y</th> <th>Z</th> </tr> </thead> <tbody> <tr> <td><math>\leq 2</math></td> <td><math>\leq 1.5</math> (Can not reach ITO terminal)</td> <td><math>\leq t</math></td> </tr> </tbody> </table> </div>	X	Y	Z	$\leq 2$	$\leq 1.5$ (Can not reach ITO terminal)	$\leq t$							
X	Y	Z											
$\leq 2$	$\leq 1.5$ (Can not reach ITO terminal)	$\leq t$											
<p>E Type:Corner 2 (beside seal)</p> <div style="display: flex; justify-content: space-between;">  <table border="1" style="width: 80%; border-collapse: collapse;"> <thead> <tr> <th>X</th> <th>Y</th> <th>Acceptable QTY</th> </tr> </thead> <tbody> <tr> <td><math>\leq 3.0</math></td> <td>Can not reach seal</td> <td>Any</td> </tr> </tbody> </table> </div>	X	Y	Acceptable QTY	$\leq 3.0$	Can not reach seal	Any							
X	Y	Acceptable QTY											
$\leq 3.0$	Can not reach seal	Any											
<p>F Type :Back of the ITO terminal</p> <div style="display: flex; justify-content: space-between;">  <table border="1" style="width: 80%; border-collapse: collapse;"> <thead> <tr> <th>X</th> <th>Y</th> <th>Z</th> <th>Acceptable QTY</th> </tr> </thead> <tbody> <tr> <td><math>\leq 3.0</math></td> <td><math>\leq 1.0</math></td> <td><math>Z \leq 1/2t</math></td> <td>Any</td> </tr> </tbody> </table> </div>	X	Y	Z	Acceptable QTY	$\leq 3.0$	$\leq 1.0$	$Z \leq 1/2t$	Any					
X	Y	Z	Acceptable QTY										
$\leq 3.0$	$\leq 1.0$	$Z \leq 1/2t$	Any										
<p>G Tyep:Crack</p> <div style="display: flex; justify-content: space-between;">  <p style="margin-top: 20px;">Can not accept any crack at anywhere</p> </div>													

No.	Item	Criterion								
7	Pin hole	 <p> <math>D=(X+Y)/2</math>            X:pin hole length            Y:pin hole width            d:pattern(segments,dot) width         </p> <table border="1"> <thead> <tr> <th>D</th> <th>Acceptable QTY</th> </tr> </thead> <tbody> <tr> <td><math>D \leq 1/5d</math> and <math>D \leq 0.15</math></td> <td>Any</td> </tr> <tr> <td><math>D \leq 1/5d</math> and <math>0.15 &lt; D &lt; 0.2</math></td> <td>1</td> </tr> <tr> <td><math>D &gt; 1/5d</math> or <math>D \geq 0.2</math></td> <td>0</td> </tr> </tbody> </table>	D	Acceptable QTY	$D \leq 1/5d$ and $D \leq 0.15$	Any	$D \leq 1/5d$ and $0.15 < D < 0.2$	1	$D > 1/5d$ or $D \geq 0.2$	0
D	Acceptable QTY									
$D \leq 1/5d$ and $D \leq 0.15$	Any									
$D \leq 1/5d$ and $0.15 < D < 0.2$	1									
$D > 1/5d$ or $D \geq 0.2$	0									
8	Total number of acceptable defect	A area(active area) Maximum 2 minor non-conformities per one unit. Defect distance: should be over 10 mm between each point B area(Visible area) It is acceptable when it is no trouble for quality and assembly in customer's end product								

## 4. RELIABILITY TEST

### 4.1 Reliability Test Condition

NO.	TEST ITEM	TEST CONDITION
1	High Temperature Storage Test	Keep in $80 \pm 2^\circ\text{C}$ 96 hrs Surrounding temperature, then storage at normal condition 4hrs
2	Low Temperature Storage Test	Keep in $-40 \pm 2^\circ\text{C}$ 96 hrs Surrounding temperature, then storage at normal condition 4hrs
3	High Temperature Operation	Endurance test of electrical stress (Voltage & Current) and the thermal stress to the elemen Keep in $70^\circ\text{C} \pm 2^\circ\text{C}$ 96 hrs
4	Low Temperature Operation	Endurance test of electrical stress (Voltage & Current) and the thermal stress to the element. Keep in $-20 \pm 2^\circ\text{C}$ 96 hrs
5	High Humidity Storage	Keep in $+40^\circ\text{C}/90\%\text{RH}$ duration for 96 hrs Surrounding temperature, then storage at normal condition 4hrs(excluding the polarizer)





liquid crystal is poisonous.)

- (4) If liquid crystal is exposed to skin, wash the area thoroughly with alcohol or soap.
- (5) When disposing of the product, please observe industrial waste disposal laws in each country and district.
- (6) In case of injury, give immediate treatment and consult with a doctor.
- (7) This product is constructed precisely. Don't disassemble or modify.

※ Neglecting this mark can cause injury to humans and damage to materials

## 6.0 PACKING SPECIFICATION

TBD